REPORT OF THE CHIEF OF THE BUREAU OF HOME ECONOMICS, 1936

United States Department of Agriculture,
Bureau of Home Economics,
Washington, D. C., August 31, 1936.

Hon. Henry A. Wallace,
Secretary of Agriculture.

Dear Mr. Secretary: I submit herewith the report of the Bureau of Home Economics for the fiscal year ended June 30, 1936.

Louise Stanley, *Chief.*

CONTENTS

INTRODUCTION

During its 13 years of existence, the Bureau of Home Economics has been engaged in investigations of the relative utility and economy of agricultural products for food, clothing, and other uses of the home. From these investigations there have come special suggestions in the way of plans and methods for the more effective utilization of such products for these purposes. In studying utility, however, it is important to determine economy of use and use requirements for satisfactory levels of living. Our program of research in the broader aspects therefore concerns itself with the requirements of family groups for all types of goods and services necessary to make effective use of national resources and capacities.

In line with this broad program of research, special emphasis has been placed during the last year on a study of the consumption habits of American families. This emphasis is due in part to the increasing demands of families for a solution of problems in family economics. In large measure it is due also to the need for better information for programs of national planning, and to requests from business for indications as to probable changes in consumer demands in relation to consumer-purchasing power.

Some of the challenging questions that come to the Bureau ask: How much more of different types of food must be produced if all the people of this country are to be well fed? How much clothing and what kinds do consumers buy when they have as little as $250 a year to spend for all family needs, or as much as $2,500 or $5,000? How much of house-building materials and of house furnishings and equipment do families at different income levels purchase? How should a family of four or five distribute its income of this or that amount,

FOOD UTILIZATION

MEAT COOKING

In cooperation with the Bureaus of Animal Industry and Agricultural Economics and various State experiment stations, the study of meat quality has been continued. About 500 cuts from experimental animals were cooked to determine the loss of weight during cooking and the palatability of the meat as affected by the feed, sex, and age of the animals and the methods of curing and storing the meat.

The study of factors that influence the shrinkage, or loss of weight, of meat during cooking has also been continued. To determine the influence of fat and water content of beef on shrinkage, data were analyzed for 99 pairs of rib roasts which represented four degrees of fatness, namely very fat, fat, medium, and thin. The fat and water content of the right cuts was determined by the Bureau of Animal Industry. The corresponding left cuts were all roasted by the same method to the rare stage, using a slow oven temperature (125° C.) for the finish after searing. The difference in weight of the roasts before and after cooking was the total shrinkage. The pan drippings, mainly fat, were weighed. The volatile loss, due to evaporation, was less than, but a reasonably good approximation to, the water loss of the meat. Fat and water content of the right cuts and cooking losses of the left cuts were averaged respectively for the roasts in each of the four degrees of fatness. Calculated on the basis of the weight of the cut trimmed and including bone, the average percentage fat content, water content, total loss of weight, evaporation loss, and pan-drippings loss were, respectively, as follows for beef ribs classified as very fat, fat, medium, and thin: 38, 34, 13.0, 7.0, 6.0; 29, 39, 12.0, 7.5, 4.5; 19, 44, 12.1, 9.1, 3.0; 12, 47, 11.7, 10.1, 1.6.

A similar study is in progress on the shrinkage of beef ribs of six carcass grades when roasted by several different methods. The results are being prepared for publication.

Definite advances have been made on the quantitative measurement of the quantity of juice in cooked meat. This measure is intended to supplement the human judgment in the meat-palatability tests and may eventually replace it.

POTATOES AND OTHER VEGETABLES

In cooperation with the Bureau of Plant Industry a standard cooking test was used to determine any relation of fertilizer composition to the after-cooking blackening of potatoes. The results showed little relation between soil treatment and potato blackening, particularly with reference to the use of potash in the fertilizer mixture. This study is to be repeated with increased amounts of potash used in the fertilizer.

Twenty-seven seedling potato varieties were studied for table quality in determining varietal selection in the breeding work being conducted by the Bureau of Plant Industry.

Standard cooking tests were made to determine any variation in cooking quality of one variety of potatoes produced within one field and the effect of maturity of potatoes on their cooking quality. These tests will be repeated before the results are analyzed.

Eighty unnamed varieties of soybeans were judged for cooking quality (as a green vegetable) in cooperation with the Bureau of Plant Industry. Of these 13.7 percent were very good, 32.5 percent good, 36.2 percent fair, 17.5 percent poor. The quality ratings for six varieties were compared with those grown in Iowa and Illinois. These ratings did not correspond closely, showing that environment affects the quality of the green vegetable bean. Some study of time of gathering showed that it was a factor in influencing quality.

A study of vegetables has been completed in which the following information has been obtained: (1) The waste in the preparation of 1 pound of vegetables for cooking, (2) the loss in weight during cooking, (3) the yield in weight and measure after cooking of 1 pound of vegetables as purchased, (4) the weight of 1 cup of cooked vegetable, (5) the gas or electricity consumed in cooking 1 pound of vegetables. Twenty-two common vegetables have been studied.

A partial analysis of the results show that onions, tomatoes, young carrots, and snap beans lose less than 10 percent as waste in preparation for cooking. Vegetables having waste less than 20 percent are potatoes, sweetpotatoes, tur-

nips, cabbage, cauliflower, eggplant, broccoli, and squash. The vegetable having the greatest waste is corn, with 75 percent, and those vegetables growing in pods, such as peas, 62 percent, and lima beans, 58 percent. Kale and asparagus lose 50 and 42 percent, respectively, while spinach loses 20 percent when the stems are used and doubles in waste when the stems are not used.

When cooking vegetables for short periods, such as for 10 minutes, it was found that fewer British thermal units were required for cooking the same vegetables by electricity than with gas. For long periods of cooking, such as 20 minutes, there was little difference between gas and electricity, but when the cooking period was as long as 40 minutes the gas required fewer British thermal units.

A study of cooking losses has been made on several vegetables, namely, spinach, kale, chard, beet greens, and beets. Calcium and phosphorus were fairly well conserved when the vegetables were cooked either by steaming or by boiling in small quantities of water.

BREAD

A departmental committee, in a study of the effect of class of wheat, grade of flour, bleaching of flour, fermentation and baking temperatures, sponge and straight dough method, type of formula, and freshness, on the flavor of bread, found that a rich formula and fresh bread were preferred by 96 judges. The other factors had no significant effect on the flavor of bread when the consumer-preference method of judging was used.

An analysis of the judgments of 16 individuals who had experience in judging the quality of bread showed that their preferences corroborated those of the consumer group. It was found with both groups that taste was more important than odor in the ranking of the bread by the judges.

At the request of the Agricultural Adjustment Administration a study of rye flour in yeast and quick breads was made. Using dark, light, and straight-grade flours it was found that up to 50 percent of the straight-grade rye flour could be used satisfactorily in yeast breads and biscuits.

HOME CANNING AND JELLY MAKING

More information was desired regarding the effect on the quality of meat of processing no. 2 cans for 60 minutes and for 85 minutes at 250° F. Several lots of meat were canned by these processes using paired leg muscles from Prime beef, right and left semimembranosus, semitendinosus, and biceps femoris. The canned meat was given storage periods of from 6 to 8 months at room temperature. The samples were then examined and compared as to general quality, flavor, and texture. Very little difference was noted in the same kinds of muscles processed for 60 and 85 minutes, although there was a marked difference in texture and color between the different muscles. The process of 85 minutes at 250° for no. 2 tin cans and pint glass jars and 120 minutes for no. 3 cans and quart glass jars is recommended for the home canning of beef, veal, lamb, mutton, and pork to prevent spoilage losses and the possible development of botulinus toxin during storage of the canned meat. Chicken canned without bone is given the same processing time, but chicken with bone in no. 2 cans is processed 55 minutes at 250°. The bone helps to conduct heat into the meat.

A study was carried on to compare the method recommended by the Bureau for testing jelly with a method in which a commercial "jelmeter" is used. The jelmeter, a specially calibrated pipette, is used to determine the viscosity of the extracted fruit juice and the reading obtained indicates the quantity of sugar to be used with the juice, as well as the final weight of the jelly. Seven different lots of jelly (over 400 glasses) were made from five kinds of fruits. Specific gravity, viscosity, and pH (indicator method) of the juices were determined. The jellies were stored 6 weeks to permit them to reach their optimum jelly strength. They were then scored for general quality, flavor, and texture. A numerical value for jelly strength of each glass of jelly was obtained by the use of a jelly-strength tester. Considering all the factors of quality the method in use by the Bureau for making jelly was found to be the more satisfactory for use in the home.

Seventeen varieties of strawberries were studied for preserve-making qualities. The preserves are in storage for 3 months and then will be judged for quality.

SORGO

A study of the use of sorgo in food preparation showed that it was a very satisfactory substitute for molasses and in many cases gave a more desirable product. It resembles honey in its use to replace sugar in baked products, in that when one-half the sugar is replaced by sorgo, the liquid is reduced 25 percent, and when all the sugar is replaced by sorgo, the liquid is reduced 50 percent.

CONSUMER ACCEPTANCE OF DRIED SKIM MILK

A study has been made of the distribution of dried skim milk by the Commodity Purchase Section of the Agricultural Adjustment Administration to show the consumer acceptance of this project, the forms in which it could be distributed more satisfactorily and economically, and the most acceptable uses in the home. A summary of the returns from the States in which this product was distributed by the Federal Emergency Relief showed that when an adequate educational program was undertaken which pierced the indifference of consumers to a new product, dried skim milk was accepted, appreciated, and a continued supply was requested by relief families.

Dried skim milk meets especially well the needs of low-income groups. For higher income groups, it will be used only by those appreciative of its nutritive value. Any large demand for it depends on keeping down the price to the lowest possible level by low distribution costs and storing the product during seasons of plentiful supply for use during periods when the milk supply is less abundant.

The recent report of the health committee of the League of Nations stresses the importance of food to health with special emphasis on wiping out diseases like pellagra which are based definitely on an inadequate food supply. Plans are being made, in cooperation with the distribution of surplus supplies of dried skim milk, to see that these reach families in which pellagra is prevalent as one method of helping to stamp out this disease.

A detailed nutrition study, made with 240 families, showed great improvement of the quality of the diet from the use of dried skim milk. This is especially apparent in families of low income in which the amount of milk used is normally low. These families use the dried skim milk in beverages such as cocoa or milk shakes; in making breads, particularly biscuits and corn bread; in cooked cereals and cream soups.

Physical examinations were made of the 3- and 4-year-old boys in these families before and after the addition of the milk to the diet. These data are now being analyzed to see whether there was any measurable change in nutritive status during the 4-month period of feeding. Incidentally this study has made it possible to evaluate different physical measures suggested as indicative of the status of nutrition.

ECONOMIC STUDIES

CONSUMPTION HABITS AND NEEDS OF FAMILIES

The need for more extensive data on the consumption patterns of different population groups has been increasingly recognized by various Federal agencies. Mention was made in last year's report of participation by the Economics Division in the planning of a large-scale study of the consumption habits of American families by a group of Federal agencies.

Upon the passage of the Emergency Relief Appropriation Act of 1935, proposals to undertake the study of consumption habits as a Federal Works project were submitted jointly by the National Resources Committee, the Bureau of Home Economics, and the Bureau of Labor Statistics, with the two latter constituting the administrative agencies. The study of consumer purchases was approved by the Works Progress Administration in December 1935.

Details of schedule forms and instructions for collection, editing, and tabulating the results of the study have been developed cooperatively by the two bureaus administering the field work of the project, the National Resources Committee, the Central Statistical Board, and the Works Progress Administration. Field work is under way under the direction of the Department of Agriculture in 18 small cities, 132 villages, and in 63 counties in 22 States, representing 13 type-of-farm areas. Under the direction of the Bureau of Labor Statistics, field work is under way in 2 metropolitan areas, 6 large cities, 16

middle-sized cities, and 10 small cities. Together, these two studies will furnish information on income and expenditure patterns for a cross section of the population living in communities of different degrees of urbanization and representing different occupational groups, different income levels, and different family types. From thousands of city and village families information will be available on such points as total income, the proportion attributable to earnings from employment or business and to other sources, and the share of the income secured by the principal wage earner and by secondary wage earners. From farm families information will be available on income from farming, both cash and in kind, and from earnings off the farm, as well as income from investments and other sources.

From a smaller number of families information is being requested on expenditures for housing, food, clothing, transportation, medical care, various other types of goods and services, and on savings. In addition, from a small sample of families, detailed information will be secured on the kinds and quantities of food, household equipment, furnishings, and clothing procured. As of June 30, 1936, approximately half of the field work was completed and the organization of statistical pools for the analysis of the data was well under way.

Data from studies of farm-family living made since 1922 have been compiled in order to discover what differences in the patterns of expenditure are found among farm families spending different amounts per capita and among families at different levels of per-capita value of family living. These data are useful in developing normative budgets for farm families, in revising cost-of-living indexes, and will serve as historical material for comparing with the current study of consumer purchases.

ECONOMY AND ADEQUACY OF AMERICAN DIETS

An analysis is being made of the kinds and quantities of food purchased and the nutritive value of the diets of wage-earning families. This analysis is based on records collected by the Bureau of Labor Statistics in conjunction with its 1934–35 study of disbursements of families of wage earners and low-salaried clerical workers, according to plans developed jointly by the two Bureaus. About 2,500 records have already been placed at the disposal of the Bureau of Home Economics for this analysis. In order to speed the analysis of these data, the Works Progress Administration approved a project for statistical assistance. Thirty persons from relief rolls have worked on this project over a 6-month period. As a result, figures will soon be available on the kinds and quantities of food purchased by city wage-earner families in different sections of the country at different seasons of the year, and at different levels of expenditure for food. The diets of these families have been analyzed for their nutritive content and appraised in the light of present dietary standards. A preliminary report appeared in the July issue of the Monthly Labor Review.

This preliminary report, together with an analysis of the character of the diets of nonfarm American families as shown by studies made over the last 20 years, was sent to the International Labor Office and to the Health Committee of the League of Nations in December 1935.

By classifying these diets into eight groups, arranged by $32 intervals, from a level of expense for food of $32 to $65 per capita per year (1935 price levels) to a level of expense of $258 to $290 per capita per year, it may be seen that the total quantity of food available to the household increases markedly with increased expenditures. The increase in weight of food per capita was almost threefold, with the percentage increase from one level to another at the lower levels of expense much greater than at the upper levels.

For some food groups, as the grain products, the increases in purchases were relatively small with increase in expenditure. Foods from the cereal grains are, as a rule, relatively cheap in relation to their ability to assuage hunger and yield satisfaction. Hence they appear, as might be expected, in generous amounts in low-cost diets, as well as in expensive diets.

The consumption of milk increases very rapidly with increasing expenditures at the lower levels, but less so after the pint-a-day level of consumption is reached. Changes in the quantities consumed of fruits and vegetables (other than potatoes and dried legumes) with increasing expenditure for food are very striking. The increase from the lowest to the highest level of expenditure is almost sixfold. Citrus fruits, tomatoes, leafy, green, and yellow vege-

tables appeared to comprise about 40 percent of the total in each level of expenditure for food. These fruits and vegetables are mentioned especially because of their significance as sources of vitamins and minerals.

The increase in the consumption of lean meats and fish is almost threefold between the lowest and highest levels of expenditure, while the consumption of fatty foods almost doubles. Butter consumption increases almost five times, but the consumption of other fatty foods remains almost constant. It would appear that butter is used in addition to and not as a substitute for lard, bacon, salt pork, and other fats and oils.

The quartile of the nonfarm population spending the most for food consumes about one-third of the milk, fruits, and vegetables (other than potatoes and dried legumes), and of meat, fish, and eggs, whereas the quartile spending the least for food consumes about one-sixth of those products. Differences in consumption at different economic levels in any one region are much more important than differences between geographical regions at any one level. The most frequent level of expenditure for food among families from whom dietary records have been taken was found to be that ranging from $100 to $130 per capita per year (1935 price level). About half of the families were spending less than $130. At this price level a minimum-cost adequate diet would probably cost about $130 per capita per year. Is half of the nonfarm population spending less than this for food? If so, it probably means that the diets fail to provide as wide a margin of safety over probable minimum requirements as would seem advantageous in one or more respects.

At the lowest levels of expenditure for food the calorie intake is far enough below average for the population and probable need so that one would not be surprised to find retarded growth in children and undernutrition in adults. On the other hand, the figures shown for families spending the larger amounts for food probably represent quantities available to the household rather than physiological consumption, and include considerable household waste. Hence, the quality of the diets of the higher-income groups depends on what is wasted of the abundance that is purchased. Calorie for calorie, the food supply as purchased by families spending the largest amounts for food is only slightly higher in proteins, minerals, and vitamins than diets of low-income groups. If, however, the milk and vegetables and fruits purchased are almost completely consumed, whereas considerable waste occurs in the fats, sugars, and grain products, the food actually eaten by the higher-income groups may be considerably richer in minerals and vitamins than the diets of low-income groups.

The percentage of the calories in low-income groups derived from grain products is much higher than in the higher-income groups; it ranges from more than 40 percent in the lowest level of food expense here shown to somewhat less than 30 percent of the calories at the highest level. An opposite trend may be observed for most other groups of foods. The percentage of calories derived from milk almost doubles; the percentage derived from lean meats, fish, and eggs increases significantly.

While these statements on food habits are based on all available data, it is recognized that they are rather fragmentary. The study of consumer purchases, now under way as a Federal Works project, will furnish more authoritative figures on food-consumption habits and on food expenditures. It will show, for example, how food-consumption habits may vary among families spending the same amounts for food but representing different socio-economic groups. It will also provide figures on the proportion of the native white families of each type that represent different levels of food expenditures.

There is widespread interest in these data at the present time, not only from the standpoint of science and social welfare, but also from the standpoint of their implications for economic planning. The governments of many nations as well as international and national bodies of economists, educators, and others interested in social and economic planning have given much attention to these problems during the last few months.

FAMILY BUDGETS

The need of families for help in their budgeting problems continues, as is evidenced by requests from families at all income levels. To meet these a bulletin on Diets to Fit the Family Income has been prepared. This presents in a popular way the principles underlying choice of adequate diets at different income levels. This publication relates four diet plans to different income levels for families of different size and shows how the diets may be modified

to meet local and individual family need. A similar publication to help farm families attain a better food supply through effective purchase and home-production programs is under way. To meet the immediate requests a mimeographed pamphlet entitled "Planning Farm Family Living" has been prepared and is being widely used by extension workers and those engaged in rural resettlement.

In connection with the annual meetings on the economic outlook for agriculture a week's conference was held in October with the collaboration of the Extension Service and the Bureau of Agricultural Economics, on farm-family living and the implications of the present economic situation. An innovation of the program was the preparation of a summary of the conferences and of the charts, which has proved of great assistance to extension workers and others dealing with farm-family living.

In addition to research, extending the boundaries of our knowledge on which to base programs of consumer education in the field of family economics, much time has been devoted to assistance of other Federal agencies and of individuals whose problems impinge on those in the field of family economics.

TEXTILES AND CLOTHING

DETERIORATION OF WOOL AND COTTON DURING USE

The rate and nature of the deterioration of textile materials caused by use and cleaning is of importance to consumers, as one of the measures of the relative value of different fibers and fabrics. In connection with serviceability studies of various grades and kinds of cotton and of wool which the division now has under way, methods are being developed for determining the amount of damage fibers undergo and the causes for this deterioration.

For example, a method of measuring wool damage due to scale breakage was developed based on the Rimington-Pauly test. Simpler procedures were substituted for the more difficult manipulations of this test, thereby reducing the work involved. The modified method proved to be quite sensitive to small variations in the amount of damage to both fibers and fabrics, and this sensitivity decreased but little as the extent of damage became greater. Reproducible results were obtained for fabrics both slightly and extensively deteriorated. A linear relationship was found to exist between the results of this test and the strength index of the fabric. The extent to which undyed fibers or fabrics have been damaged in any step of the manufacturing process or subsequent service can be determined by means of this procedure.

A service study of blankets made from various combinations of fine, ½-blood, ⅜-blood, ¼-blood, and reworked wool in cooperation with the Bureau of Animal Industry has been completed. This is the first work reported in which woolen fabrics of known history were put into use and tested physically and chemically throughout various stages of their wear life.

It was found that, due to shrinkage, the breaking strength of the laundered blankets was greater than that of the new fabrics. The blankets made of finer wool shrank more than those of coarser wool. The fabrics made from the new wool increased more in weight and thickness with laundering than those from the reworked wool. Although bursting strength was found to decrease slightly with wear, it actually dropped very little as long as a fabric was serviceable.

The air permeability dropped as wear and laundering continued. A large increase in permeability was observed at the end of the period of service. As wear progressed, the heat transmission of the blankets became smaller. During the major period of use, the laundered blankets were warmer than the new ones as measured by both air permeability and heat transmission. This increase in warmth is probably due to thickening as a result of shrinkage. The values for resistance to abrasion rated the various fabrics in the same order as did the actual service test.

A comparison of the fibers in the fabrics with the fibers from which the fabrics were made showed that the former were the more deteriorated chemically. Each finishing process tendered the fabric chemically, bleaching causing greater changes than scouring or napping. The less damaged the fibers in the fabrics the smaller was the deteriorating effect of bleaching. The sulphur, nitrogen, moisture, and methylene blue absorption values showed that the new fabrics made from the finer wools were less weakened chemically than those from the coarser. However, fabrics made from fine wools were more liable to scale breakage. The addition of reworked wool to these fabrics resulted in increased tendering.

With service, the sulphur and nitrogen content of the fabrics decreased while the percentage of moisture and ash increased. Wear caused a large progressive rise in methylene blue absorption, which is one measure of deterioration. Wear also caused a rise in scale breakage, which increases as a woolen fabric becomes more damaged. And the susceptibility of each material to bacterial attack increased with use. Throughout this study, the fabrics containing reworked wool deteriorated decidedly more chemically than did the fabrics made from new wool.

Although the fabrics contain approximately five times as much nitrogen by weight as sulphur, service caused a greater loss in the latter. A linear relation was found to exist between sulphur content and strength index of the blankets of any one fabric. Methylene blue absorption and scale breakage proved to be more sensitive measures of deterioration in the woolen fabrics than the determinations of sulphur, nitrogen, or moisture. The scale-breakage values varied directly with the observations for bacterial resistance indicating that the fabrics are more easily attacked by bacteria as the scale breakage increases.

A service study on sheeting made from cotton grown under irrigated and nonirrigated conditions is being made in cooperation with the Bureau of Agricultural Economics. The laboratory work for this study has been completed and the results are being analyzed. The groundwork is being laid for another cooperative study involving the use of cottons of different staple lengths. A previous investigation in this division indicated that slight variations in the staple of cotton have an important influence on the serviceability of the resulting fabrics.

COTTON FABRIC FINISHING

Further studies have been conducted on the stiffness which starches produce on fabrics. Since the Department of Agriculture has been interested in the possible use of sweetpotato starch and has considered its suitability for the mill sizing of cotton warp yarns, sweetpotato starch was added to the list of starches investigated. Four commercial laundry starches (modified corn starches) were also included. It was found that starches produce stiffness on cotton fabrics according to the order: Canna starch (greatest stiffness), dasheen, sweetpotato, wheat, rice, corn, and potato starch (least stiffness). This same order was maintained on all seven of the different cotton fabrics that were studied. Two of the modified corn starches produced greater stiffness on the fabrics (due to the borax they contain) than the laboratory-prepared corn starches; the other two produced less stiffness.

Measurements of the rate of flow of these starches were made. Sweetpotato starch has a low rate of flow (similar to canna starch) and the modified corn starches form thin pastes—much thinner than corn starch. It was found that, in general, stiffness produced on fabrics by starch pastes depends on the consistency of the pastes, those having a higher rate of flow producing less stiffness than those having a lower rate of flow.

Strength tests of these sized fabrics were also made. Potato, canna, and sweetpotato starches have the greatest strengthening effect on cotton fabrics, then corn, rice, and dasheen, while wheat has the least. The modified corn starches have practically no effect on strength. Two papers reporting this work have been prepared for publication.

VEGETABLE DYES

The increased interest in the subject of natural dyes and the many requests for information on their use prompted the Extension Service to cooperate with this division in making such information available to rural women. Consequently, arrangements were made for demonstrations on the use of natural dyes at farm and home weeks and at extension workers' conferences in nine Southern States.

Through cooperation with the Bureau of Plant Industry, seeds of the madder plant, which is a source of an excellent natural dye, were obtained and given to home-industry extension specialists who, in turn, distributed them to interested women in their States. As a result madder beds have been started in many States. This division also cooperated with the Division of Foreign Plant Introduction of the Bureau of Plant Industry in analyzing the dyeing properties of the plant material *Escobedia scabrifolia,* collected in Colombia, South America.

QUALITY GUIDES FOR PURCHASERS OF TEXTILES AND CLOTHING

The series of textile and clothing buying guides for consumers was extended to include a leaflet on women's cloth coats. Through publications of this kind, the Bureau is attempting to assist homemakers in selecting those fabrics best suited to their own individual and family needs and at the same time to point out to manufacturers the textile materials and the information about them which consumers must have if they are to use their buying power effectively for the good of all concerned.

Photographs that supply the same type of information pictorially have been prepared and, through the cooperation of the Extension Service, have been made into folios suitable for lending to extension classes, women's clubs, and other groups studying consumers' problems. These have been in such constant demand that they can be scheduled only for limited periods in each community requesting them. This year, five such folios have been added to the series. They deal respectively with the buying of hosiery (65 plates), women's coats (60 plates), women's wash dresses (50 plates), towels (9 plates), and sheets (9 plates).

As a basis for buying guides of this kind, the division is making studies of textile commodities as they appear on the retail market. These show the great range in the qualities that are of especial importance to consumers and emphasize to household buyers the need of having exact information regarding these characteristics. At the same time, through such studies, it has been possible to inform manufacturers of the possibility and advantages of introducing grading systems and other types of informative labels that will give consumers a factual basis on which they can find merchandise satisfactory to them in quality as well as in price.

In this connection, the information now appearing on labels attached to clothing and household textiles has been compiled and analyzed. A report of this was published, giving consumers the meaning, as defined by present usage, of the trade and technical terms used on such labels.

In cooperation with the Economics Division the publication entitled "Present Guides for Household Buying" published in 1934, was revised and enlarged. This is a compilation of the grading systems and specifications now existing for consumers' goods which are available for the assistance of household buyers.

Through traveling exhibits of infants' and children's clothing, suggestions are given for appropriate and modern uses of cotton materials. Also, as an aid in raising standards of clothing selection and construction, a set of girl's garments was made this year for use in the judging contest of the National 4–H Club Congress. It was then arranged as a traveling exhibit for 4–H club leaders to use in clothing classes with girls organized in these groups. Requests for this have kept it on a continuous schedule throughout the country, and demonstrate the need for this type of material for the use of extension workers. A new design for the 4–H club uniform was also worked out in cooperation with State and Federal club leaders.

HOUSEHOLD EQUIPMENT

Considerable time has been spent the past year in building up a body of material relative to different types of household equipment in order to take care of requests that come into the Bureau for information on these subjects, and also to be used in planning the testing of such equipment whenever such additional laboratory work can be instituted. Experimentation in the field of household equipment has been slow, due to the very limited staff.

TESTS ON STOVES AND FUELS FOR COOKING

One insulated coal range was tested thoroughly. The average daily fuel consumption with steady maintenance of the fire was very slightly under 9 pounds of chestnut anthracite, with an additional 10½ pounds needed on the day the fire was started. The stove may be maintained for a year on approximately 1.6 tons of coal with continuous heat night and day, as well as an almost continuous supply of 12 gallons of water either at or just under boiling temperature.

The standard boiling test gave a speed of 8½ minutes for bringing 2 quarts of water from 70° F. to boiling point. Practical cooking tests based on a week's menus for a low-income-level diet again showed the unusual speed of cooking on this stove, both for surface and oven cooking. Out of 34 cooking processes involved in the week's menus, 23 proved faster on this coal stove than on either typical gas or electric ranges, and only 5 proved faster on both gas and electric stoves than on this coal range. Coffee required about one-third the time needed on gas and electric stoves. This superior speed is due in part to the care expended in the design of the stove to secure unusual efficiency by good insulation and by concentration of heat over a small cooking surface, and in part to the design of utensils to be used on the stove. The range also excelled in the cooking (with almost no attention needed) of foods requiring long, slow cooking, due to the provision of a second oven with a steady temperature of approximately 250°. The heating effect of the stove on the room was almost negligible because of the excellence of the insulation.

At the request of two manufacturers and with the cooperation of the Washington Gas Light Co. in supplying the required test meters, a start has been made on the testing of gas ranges. One of the gas ranges submitted was a low-cost stove intended for use in low-cost housing developments. The temperature tests made on this oven by means of thermocouples showed a very steady maintenance of temperature for any given setting of the thermostat with a variation of only 2° F. over an interval of 1 hour after reaching the steady temperature. The oven required 20 minutes for a rise of temperature of 440° from room temperature. The surface units on the average required 14 minutes and 4 seconds to bring 2 quarts of water from 70° to boiling point.

A study of the comparison of different fuels used for cooking has been undertaken as a joint project with the Bureau of Agricultural Engineering. Tests are being made on typical ranges built for use with the respective fuels, using menus for low-income-level, moderate-income-level, and liberal-income-level diets. By testing 2 days' menus for each of these different diets, not only is a fair check obtained on the different kinds of cooking performance demanded of a stove by the average housewife, but also data are secured on the costs of preparation involved for these meals in the different income-level diets.

HOUSEHOLD REFRIGERATORS

The refrigeration studies have been continued with the emphasis on no-load performance tests of individual refrigerators. Additional electric refrigerators were tested, two for the Electric Home and Farm Authority. The tests of two kerosene units were completed, and substantiated the results reported last year, namely, that a kerosene refrigerator in a no-load test at 90° F. used about 12 gallons of kerosene a month with an average internal temperature of 43°.

Since many ice-cooled refrigerators have been greatly changed in type and improved in quality since the Bureau published detailed results for ice-cooled cabinets in 1930. tests of seven ice-cooled cabinets from seven different makers have been carried on in cooperation with the National Association of Ice Industries. These refrigerators were tested in constant temperature rooms at 90° F. and also at 70°. Internal temperatures, relative humidity, and ice-melting rates were determined as well as the effect on refrigerator temperatures as the ice in the refrigerator decreased. The cabinets were also observed for sweating when the room temperature was 90° and the relative humidity was gradually increased to 90 percent.

At 90° F. room temperature this group of ice-cooled refrigerators maintained an average internal temperature of about 49½°, while the average temperature in the space designed for milk was about 48½°. The average ice-melting rate was about 26 pounds per day or 780 pounds per month. For the group of ice-cooled refrigerators mentioned in the 1935 report, these values were respectively 53°, 46°, and 900 pounds per month. For the group of electric refrigerators mentioned in the same report the values were, respectively, 43°, 46°, and 50-kilowatt-hours a month. However, the older group, both the electric and the ice-cooled, had an average food-storage space of 6.4 cubic feet, while the newer group had 5.4 cubic feet. Thus the ice-melting rate per cubic foot of food-storage space is virtually the same in both cases, but the average temperature is very definitely improved. There are two reasons why the temperature in the milk-storage space has not improved. All of the refrigerators in this recent test were of the front-icer type, which gives a smaller temperature range within the cabinet. Another reason is that in some cases the newer refrigerators are

so designed that the indicated place for milk storage is, unfortunately, not the coldest place. This second difficulty could be corrected by redesigning the shelves and their supports. The newer refrigerators by a change in design of the ice compartment and accessories, keep the temperature more nearly constant as the ice melts down than did the older type. In those of the newer type the temperature rose a little more than 2° as the ice melted from 80 pounds to 30 pounds, while the corresponding temperature rise in a typical refrigerator of the older type was nearly 5°.

PUBLICATIONS AND INFORMATION SERVICES

The public receives the results of this home economics research through radio, press, news photographs, charts, and exhibits, as well as printed bulletins and reports in scientific journals. The following list includes the bulletins issued in the regular series of the Department and the more important of the journal articles:

The cooking quality, palatability, and carbohydrate composition of potatoes as influenced by storage temperature. By R. C. Wright, W. M. Peacock, T. M. Whiteman, and E. F. Whiteman. (In cooperation with Bureau of Plant Industry.) Tech. Bull. 507.

Cotton fabrics as affected by variations in pressure and in length of exposure during ironing. By K. M. Downey and R. E. Elmquist. Tech. Bull. 517.

Toxicity of food containing selenium as shown by its effect on the rat. By H. E. Munsell, G. M. DeVaney, and M. H. Kennedy. Tech. Bull. 534. (In press.)

Present guides for household buying. By R. O'Brien and M. M. Ward. Misc. Pub. 193, rev.

Studies of family living in the United States and other countries: an analysis of material and method. By F. M. Williams and C. C. Zimmerman. Misc. Pub. 223.

Home dyeing with natural dyes. By M. S. Furry and B. M. Viemont. Misc. Pub. 230.

Diets to fit the family income. By R. S. Carpenter and H. K. Stiebeling. Farmers' Bull. 1757.

Home canning of fruits, vegetables, and meats. By L. Stanley and M. Stienbarger. Farmers' Bull. 1762.

Honey and some of its uses. By E. F. Whiteman and F. W. Yeatman. Leaflet 113.

Quality guides in buying women's cloth coats. By C. L. Scott. Leaflet 117.

Farm family account book. By R. C. Freeman and D. Monroe. Unnumbered.

The vitamin A and C content of chili pepper. By M. B. Rutherford. The Spice Mill 58 (11): 775. Nov. 1935.

The vitamin A and D content of canned salmon. By G. M. DeVaney and L. K. Putney. Jour. Home Econ. 27: 658–662. Dec. 1935.

Further studies on the effect of sources of vitamin D in the diet of the chicken on storage of the antirachitic factor. By G. M. DeVaney, H. E. Munsell, and H. W. Titus. Poultry Sci. 15 (2): 149–153. Mar. 1936.

What is vitamin G? A survey of the literature. By H. E. Munsell. Jour. Home Econ. 28: 320–328. May 1936.

The vitamin A, B, C, D, and G content of the outer green leaves and the inner bleached leaves of Iceberg lettuce. By H. E. Munsell and M. H. Kennedy. Jour. Agr. Research 51: 1041–1046. Dec. 1, 1935.

Inhibiting effect of sulphur in selenized soil on toxicity of wheat to rats. By A. M. Hurd-Karrer and M. H. Kennedy. (In cooperation with Bureau of Plant Industry.) Jour. Agr. Research 52: 933–942, illus. June 15, 1936.

Nutritive value of diets of families of wage earners and clerical workers in North Atlantic cities 1934–35. By H. K. Stiebeling. Monthly Labor Rev. 43 (1): 14–23. July 1936.

Some methods and apparatus used in measuring the quality of eggs for cake making. By F. B. King, H. P. Morris, and E. F. Whiteman. Cereal Chemistry 13: 37–49, illus. Jan. 1936.

Physical and chemical properties of some Turkish towels. By M. B. Hays and R. E. Elmquist. Jour. Home Econ. 27: 587–592. Nov. 1935.

Terms used in textile labels. By M. B. Hays. Jour. Home Econ. 28: 151–156. Mar. 1936.

A modified method for measuring wool damage due to scale breakage. By J. H. Kettering. Jour. Home Econ. 28: 255–259, illus. Apr. 1936.

Blankets vary widely in desirable properties, various tests indicate. By M. B. Hays. U. S. Dept. Agr. Yearbook 1935: 138–140.

In addition to these technical reports of research, a number of other articles have been prepared at the request of magazines. The weekly Market Basket press release dealing with food selection, meal planning, and nutrition has been continued for newspaper use. In all, a total of approximately 200 popular articles on the various phases of home economics covered by the Bureau have been either written or vised.

The Bureau also works closely with the Radio Service of the Department both in broadcasting network programs and in preparing syndicated scripts for the use of local stations. One of the members of the staff has prepared and broadcast from Washington each week a talk on the National Farm and Home Hour, a network of 50 stations with a coverage from the Gulf to the Canadian border and as far west as the Rockies. For the Pacific Coast and the Rocky Mountain States, a representative of the Bureau broadcasts twice each week on the Western Farm and Home Hour, which has headquarters in San Fran-

cisco. On these two networks a total of 336 talks have been broadcast directly, and about 250 scripts have been vised and distributed to stations for use on local programs.

Exhibit booths illustrating the work on meat cooking and on utilization of cotton fabrics are on display at the Texas Centennial Exposition. The Bureau sent exhibits to conventions of the American Dietetic Association and the Associated Country Women of the World. Also, in cooperation with the Extension Service, illustrative material is constantly being developed for the use of home demonstration agents, teachers, and adult education groups.

The Department of Agriculture pioneered 40 years ago in the dissemination of information to the layman on human nutrition and food values. The Bureau of Home Economics continues in this tradition by using all the modern methods of acquainting the public with its findings.

U. S. GOVERNMENT PRINTING OFFICE: 1936

For sale by the Superintendent of Documents, Washington, D. C. - - - - - Price 5 cents